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From: Dave Dickerson/R1/USEPA/US

To: "Leitch, Robert A NAE" <Robert.A.Leitch@usace.army.mil>; dragosp@battelle.org; William Nelson/NAR/USEPA/US@EPA; Barbara Bergen/NAR/USEPA/US@EPA; Karl Gustavson/DC/USEPA/US; Earl.Hayter@usace.army.mil

Copy To: ElaineT Stanley/R1/USEPA/US@EPA

Delivered Date: 03/18/2009 10:43 AM EDT

Subject: Re: FW: New Bedford Harbor Plume Tracking

Bob - the study design below looks good. My only comment is lets check in with the ERDC hydrodynamic modelers as I believe they did some velocity measurements as well. And they may be able to make use of the tide velocity/direction measurements from the day 1 field work as well.

Karl, Skip, Barb and Earl - this is just an fyi re. a new ADCP initiative that we're starting (with a quick time frame) - see Battelle's email below. We're trying to take advantage of the city's navigational dredging (mech. dredging to lower harbor CAD cell) to obtain plume monitoring data to help us better understand how Superfund disposal into a CAD would behave. Three areas of the navigational dredging (which is starting as we speak) will be in areas where Superfund dredging will occur as well, so it should be valuable/representative info. Plus, if the current measurements will help the hydrodynamic/food chain model than all the better.

Dave

"Leitch, Robert A NAE" <Robert.A.Leitch@usace.army.mil>

"Leitch, Robert A NAE" <Robert.A.Leitch@usace.army.mil> 03/18/2009 08:45 AM	To: Dave Dickerson/R1/USEPA/US@EPA, ElaineT Stanley/R1/USEPA/US@EPA cc: Subject: FW: New Bedford Harbor Plume Tracking

Dave, Elaine:

The following is the City CAD Cell filling approach. Do you have any

comments/concerns?

The next step is to get the Dredging schedule via Paul L'Heureux's communication with Apex and the City.

Tx

Bob

-----Original Message-----
From: Dragos, Paul M [mailto:dragosp@BATTELLE.ORG]
Sent: Tuesday, March 17, 2009 11:53 AM
To: Leitch, Robert A NAE
Cc: Joseph.B.Mackay@army.mil; L'Heureux, Paul G NAE; Dahlen, Deirdre T; Boyle, Jeanine
Subject: New Bedford Harbor Plume Tracking

General Approach/Site Characteristics/Disposal Ops

Based on a review of the configuration of the harbor near the CAD cell, the water depths, and the instrumentation options and I have concluded that the plume tracking study can best be done using Acoustic Doppler Current Profiler (ADCP) along with whole water sampling. The water depths are quite shallow near the CAD cell (4 ft @ MLW) so I was concerned but I had a conversation with an engineer I know at the instrument manufacturer. He convinced me that the water depths are not too shallow for our application. ADCP has advantages in the field for rapid sampling and provides high density.

As I said on the phone, plumes resulting from DREDGING operations are steady state or quasi-steady in nature and so can be tracked throughout any portion of a tidal cycle. So for example, we might have two to three hours available to track a plume during an ebb tide. On the other hand, plumes resulting from dredged material DISPOSAL operations can be short-lived. How long they last depends primarily on how fine material is and secondarily on how strong currents are. (Can we get a hold of any grain size data the city has for the dredged material?) If the material is sand then the plume may last only 5 minutes. If the material is medium silt the plume may last 1/2 hour. In my experience, and given the expected sediment type, we will be lucky if we have 30 min to track a plume.

The geometry and bathymetry of the harbor just north of Popes Island makes for a complicated flow structure. (Jay - Its not anything like the simple geometry we were dealing with in the northern study area of the Boston Harbor channel, for example.) There is a deep channel to the West (up to 44 ft) but the rest of the areas is quite shallow (3-8 ft). Also, the flow diverges around Popes Island with tidal flow passing both east and west of the Island. There are strong currents in the main channel to the west of the Island under the drawbridge but, even so, some of the tidal flow must pass to the east of the Island. There is no doubt that there is a complicated flow structure in the area near the CAD cell that varies with tide phase.

From what I understood on the call, there may be only a very few dumps into the cell and/or they may be from a relatively small scow or barge. That means we may have very few chances to track plumes and the plumes may be

short lived (depends on grain size). If we can get even just one slice through the plume immediately after release, then even if all other slices surrounding the relapse point (and later in time) show clear water, the results will still present a clear story. On the other hand, if we don't get any slices through the plume because it is very course material or disposal ops don't allow us to get into the release point right way, then we have a negative result which is not very convincing to the public.

As is usually the case in this type of study, we will have no control of when these dumps happen. We will have to do everything we can (this may be up to the Corps) to get as much advances information about upcoming dumps: there ETA, volume, material type.

Study Design

Given the general approach and what we know about the site characteristics and disposal ops as described I have sketched out the proposed study design below.

1. The first day in the field will consist of a 12.5 hr tidal cycle survey using one boat and one ADCP to measure currents. Every hour we will run a series of lines throughout the area, re-occupying the same lines each hour. This will provide us with a complete 3-D picture of the tidal current velocity structure in the vicinity of the CAD cell and Popes Island throughout the tidal cycle. We'll use this information to know where to look for the plumes during the dumps.
2. Assume 4 days in the field for plume tracking. As per the call, its hard to say at present how many dumps may happened in that time. Two to four? Corps may be able to get a better handle on this. We will monitor at any opportunity but if we have any choice in the matter, releases near max ebb will be the highest priority, max flood second, and slack lowest.
3. During plume tracking we'll use two small boats with one shipboard ADCP's on each. We will try to run a set of lines through the CAD cell immediately after release to develop, at minimum, pictures of the initial plume. The hourly tide phase velocity pictures from the first day will give us the necessary a priori knowledge of where to search for the plume. The 2 boats will run parallel lines across the predominant current - 1 boat through the expected location of the plume centroid and 1 boat running lines alternately up-drift and down-drift of the centroid, the distance depending on the plume size. If the plume diverges into 2 sections, the 2 boats will separate.
4. If the dredged material is coarse and the plume disappears quickly we will need to get in there right away either around the scow if its not moving or, better, by making sure the scow moves off immediately after release (Corps communication with dredger).
5. If the dredged material is coarse and the plume disappears quickly two boats will help to at least get a few pictures of any plume within the CAD cell. One boat may miss it.
6. If the material is finer and it remains in the water volume for 30-45min then two boats will allow us to continue to track the plume as it diverges around Popes Island on an ebb tide with one boat switching ADCP setup to track the plume in the deeper water to the west.

7. Each boat will be equipped with Niskin bottles to collect whole water samples (background and plume) for lab TSS and turbidity analysis. Rapid whole water sample collection is essential to maximize time available for ADCP plume tracking. 3 stations x 2 depths x 2 boats x 2 plumes = 24 samples (minimum). x 4 plumes = 48 samples (better). Lab TSS and turbidity used to calibrate ADCP acoustic backscatter to TSS and NTU. Reference stations will be sampled near-surface and near-bottom at least 1500 ft away from the CAD cell and any dredging activity.
8. Deliverable will be a summary report presenting vertical slice and horizontal contours of backscatter data calibrated to TSS and turbidity.

We are available for a phone conference to discuss the proposed design.

Paul

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